

Northwest Branch

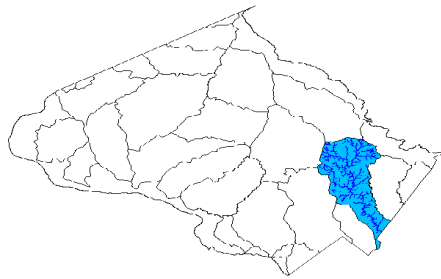
Watershed Study

Montgomery County

Department of Environmental protection

Watershed Management Division

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This study was done in cooperation with the:
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Northwest Branch

Introduction to the Watershed

The Northwest Branch watershed is located in the eastern part of Montgomery County (Figure 1). It is approximately bounded by the County line to the southeast, New Hampshire Avenue to the east, Sandy Spring to the north, and Georgia Avenue to the west (Figure 2). The watershed portion within Montgomery County is 19,605 acres (Figure 2). There are 64.2 stream miles in the Montgomery County portion of the Northwest Branch (Figure 2).

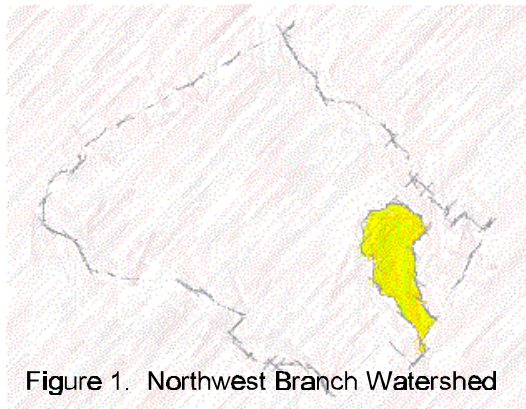


Figure 1. Northwest Branch Watershed

The pattern of watershed development can be seen in Figure 2. The majority of the watershed below Randolph Road was developed without any SWM controls. These older neighborhoods were frequently built with the smaller tributaries piped to the edge of the development. The Bel Pre Tributary, located mid way in the watershed on the west side, can be seen to have a high density of residential buildings (Figure 2), despite numerous SWM facilities, the biological condition of this Tributary in 1996 was *poor* (Figure 3). Above the Bel Pre Tributary and the Northwest Branch Golf

Course, developed areas are primarily concentrated in the Rolling Stone Tributary, Longmeade Tributary, and the upper portion of the Bachelor Forest Tributary (Figure 2). The rest of the Upper Northwest Branch watershed is relatively undeveloped, with the exception of the Bryant's Nursery Tributary which has the Hampshire Greens development currently under construction.

Forested areas below Randolph Road are mostly limited to those floodplain and upland forests within the County park system (Figure 2). These forested areas are extensive though, providing an excellent forest buffer from the County line upstream to the limits of stream valley park land in the vicinity of Bonifant Road. Upstream of Norwood Road, (Figure 2), forest land is mostly in privately owned parcels, although some is designated to become park land as the County develops.

Analysis of the 1995 and 1996 Stream Monitoring and Habitat Data.

Resource Condition

Subwatershed resource conditions (based on the IBI narrative classes) are depicted in Figure 3. Resource conditions are based on the water quality trends exhibited in the IBI scores that each monitoring station received for the spring benthic macroinvertebrate monitoring period and the summer/fall stream fish monitoring period. Each faunal group can respond to stressors in ways that provide supportive information about trends in water quality and severity of

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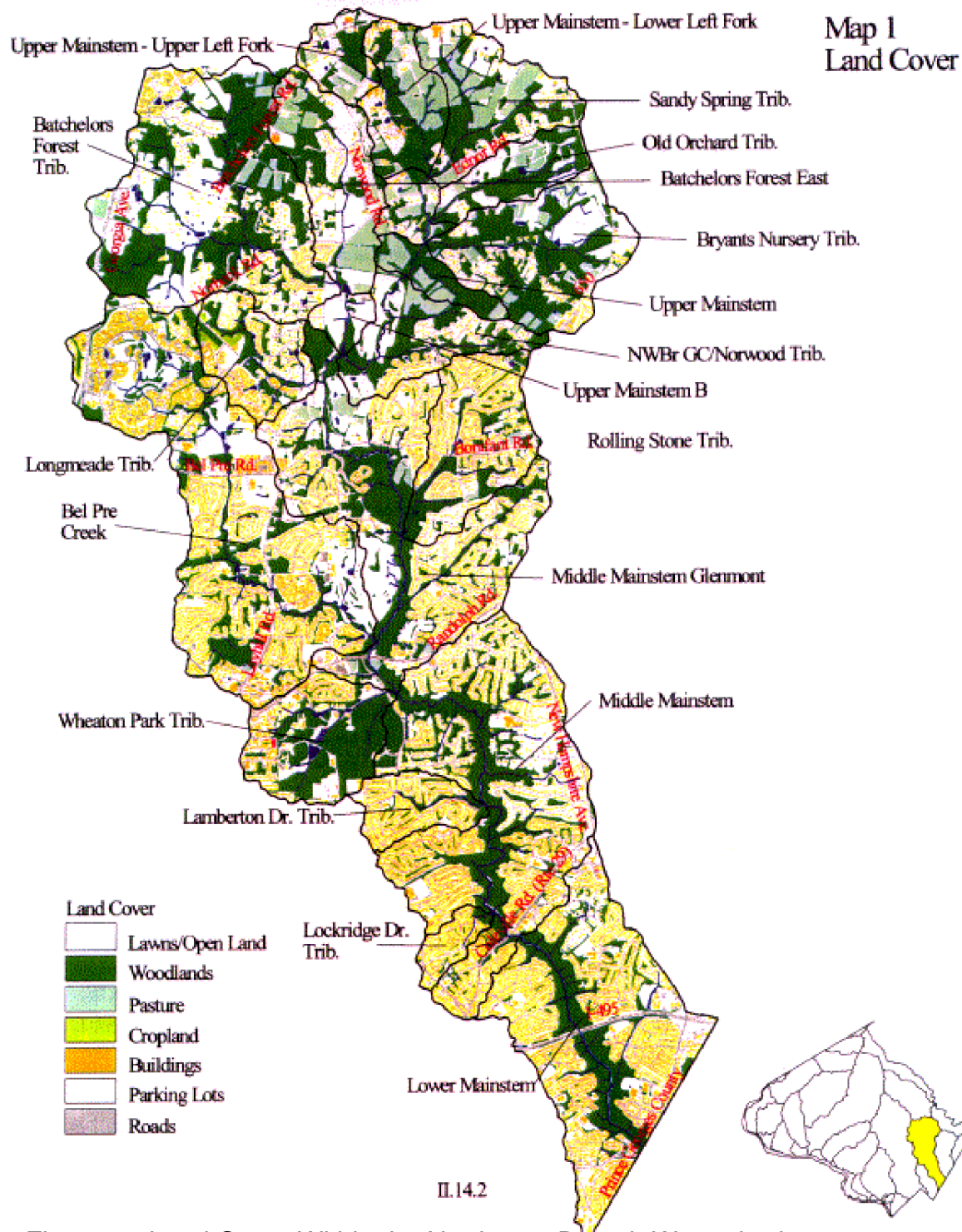
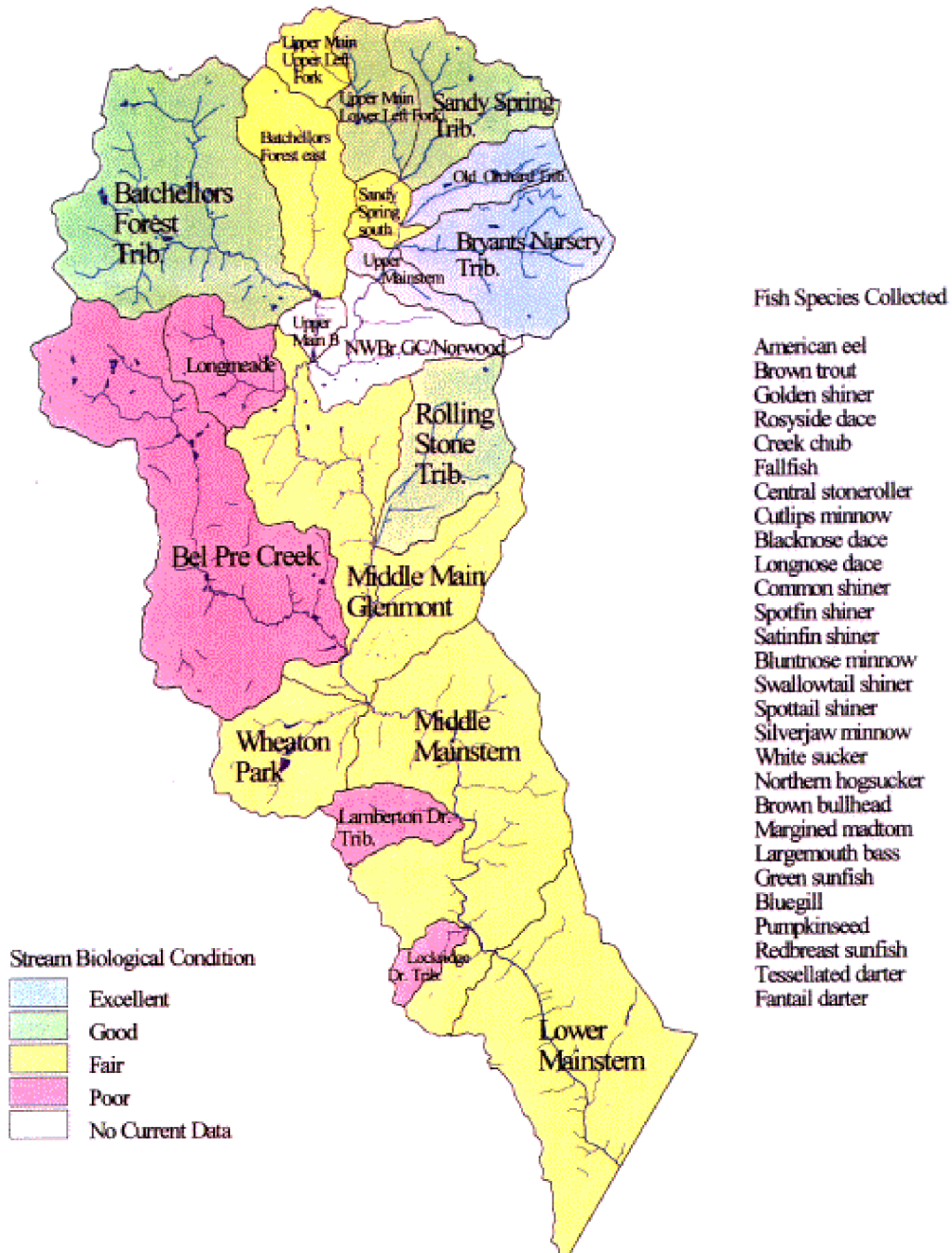


Figure 2. Land Cover Within the Northwest Branch Watershed.

Northwest Branch Stream Condition

Based on biological indicators.
See Chapter 2 for details.

Map 3



II.14.4

Figure 3. Stream Conditions Within the Northwest Branch Watershed

cumulative impacts.

Currently, the Bryant's Nursery Tributary and Old Orchard Tributary subwatersheds contain *excellent* resource conditions. Bryant's Nursery was remonitored in 1996 to verify its condition as a result of a massive sediment violation. The Batchellors Forest, Sandy Spring west tributary, and Rolling Stone Tributary subwatersheds contain *good* resource conditions. The Bel Pre Creek, Lamberton Tributary, and Lockridge Drive Tributary currently contain *poor* resource conditions. The rest of the Northwest Branch watershed is currently rated as having a *fair* resource condition (Figure 3).

Staff was not able to assign a resource condition to the Longmeade, NW branch Golf Course/Norwood, Batchellors Forest East, or Sandy Spring Tributary subwatersheds.

Existing Development/Impervious Areas.

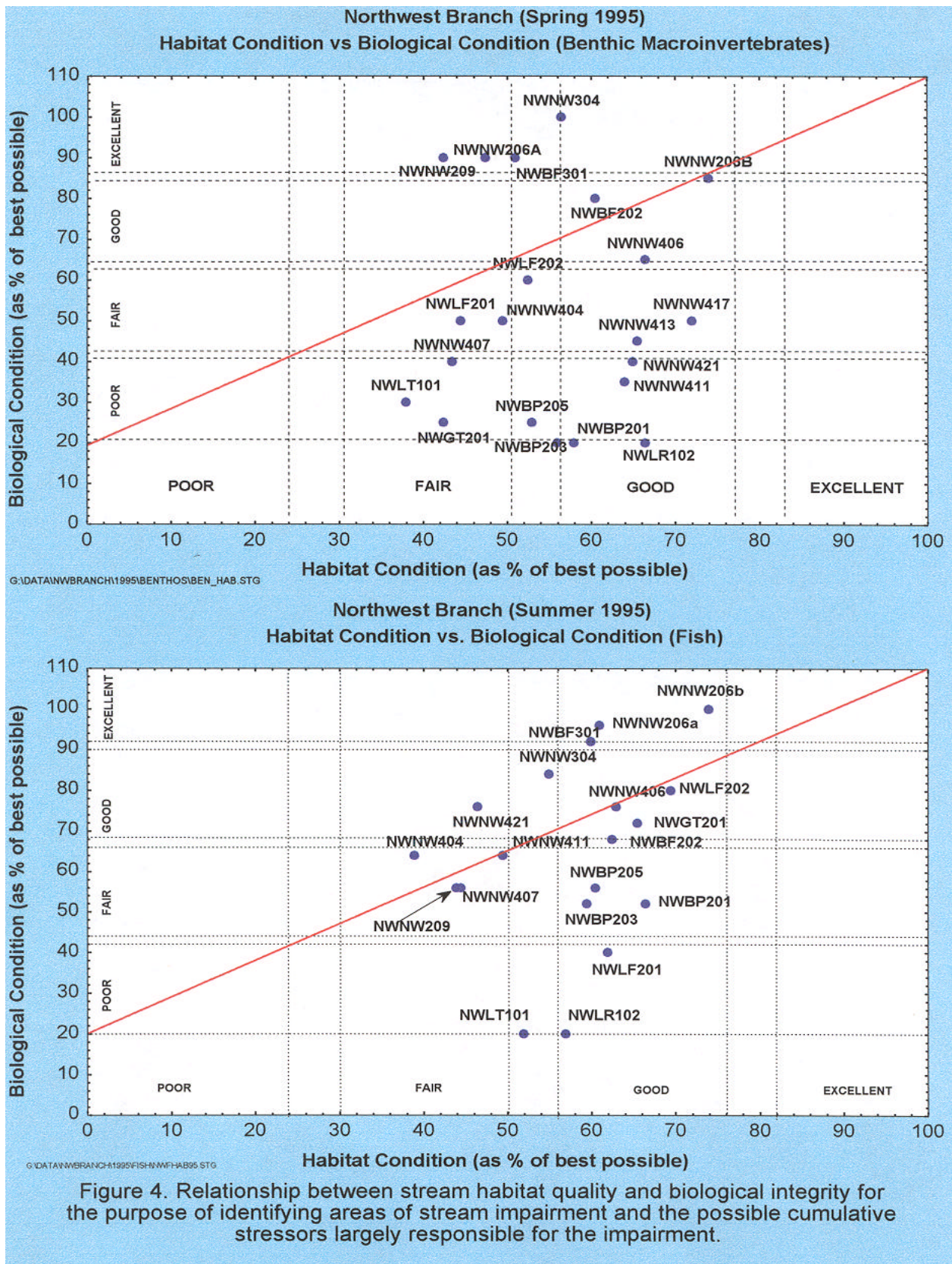
The pattern of current resource condition is not surprising given the extent of development in the watershed (Figure 2). The developed areas of the watershed are mainly below the Northwest Branch Golf Course portion of the Northwest Branch. Below this point, the resource condition is *fair* to *poor*. Above this point, the watershed includes areas having *excellent* to *good* resource conditions (Figure 3).

Examination of IBI/Habitat Relationships

The relationship of the IBI scores to the stream habitat assessment conducted when the faunal group was monitored can provide information on the stressors likely responsible for the existing resource condition. The graphs (Figure 4) assessing the IBI to habitat relationship for fish and spring benthic macroinvertebrates depict trends useful for prioritizing a restoration strategy for the Northwest Branch.

Relatively few stream areas had unimpaired conditions in both benthic macroinvertebrate and fish IBI scores (Figure 4). The benthic macroinvertebrate results had more stations with IBI/habitat scores along the expected IBI/habitat curve shown in red in Figure 4. As habitat changes, so should the IBI score change, all other factors being equal. The benthic macroinvertebrates habitat parameters could be related to specific riffle habitat features such as dominant particle size.

The Bel Pre subwatershed has a *poor* overall resource condition (Figure 3). All 3 of the monitoring stations located on the Bel Pre Creek (NWBP201, NWBP203, and NWBP205) were rated with a *poor* benthic macroinvertebrate IBI class, but having good habitat (Figure 4). If habitat is not a limiting factor, then the impairment could be caused by uncontrolled flows or a water quality problem. The same trends are evident in examining the relationship between IBI scores and habitat values for the fish monitoring results (Figure 4).



The monitoring station (NWNW209) received an *excellent* spring benthic macroinvertebrate IBI class score and a fair habitat score (Figure 4). There could be a spring nutrient enrichment occurring in this tributary from the upstream residential developments. The same area received only a *fair* fish IBI class score and a fair stream habitat assessment indicating that some level of habitat impairment is occurring in this tributary and that the fish community is responding to the habitat conditions.

The Bryants Nursery Tributary and Old Orchard Tributary both received the highest IBI scores and highest resource condition (*excellent*) possible for both the fish and spring benthic macroinvertebrate monitoring results. However, habitat was only evaluated as good in these watersheds. Further deterioration of habitat will lessen the current high resource condition in these 2 areas.

Select Stream Morphological Measurements

Several stream morphological measurements were available that are useful in further identifying possible causes of stream impairment in the Northwest Branch.

Cross Sections

Cross sections were established at most of the stations monitored in 1995. Cross sections establish a base line to assess future channel change as well as to understand the present channel condition. The cross sections depict a pattern of increased entrenchment and lateral widening from the top of the watershed to the bottom (Figure 5). The degree of entrenchment is of concern because of the amount of fines currently in the stream system and the problems associated with transporting this fine material. The stream appears so entrenched that it has lost access to its active floodplain. Increased lateral widening is also evident by examining the rows of trees originally growing along the stream banks but now four to five feet inside the channel in the vicinity of the Northwest Golf Course.

The stream still has access to an existing active floodplain in the Bryants Nursery Tributary stations (NWNW-206a & b) (Figure 5). However, after station NWNW-304 (still in the upper 1/3 of the watershed) almost every Northwest Branch station shows a stream that has become highly entrenched with associated lateral widening (Figure 5).

Pebble Counts

Pebble counts were made in riffle areas at all stations in order to better quantify the habitat utilized by the benthic macroinvertebrate community. The median particle size (D50) and the D84 particle size was calculated as well as the total distribution of riffle particle size classes. By monitoring the changes in the dominant particle sizes in the riffle habitat, DEP can track changes in the benthic macroinvertebrate habitat over time. Cobble sized D50 riffles (around 90 mm) would provide the optimal substrate for a healthy community.

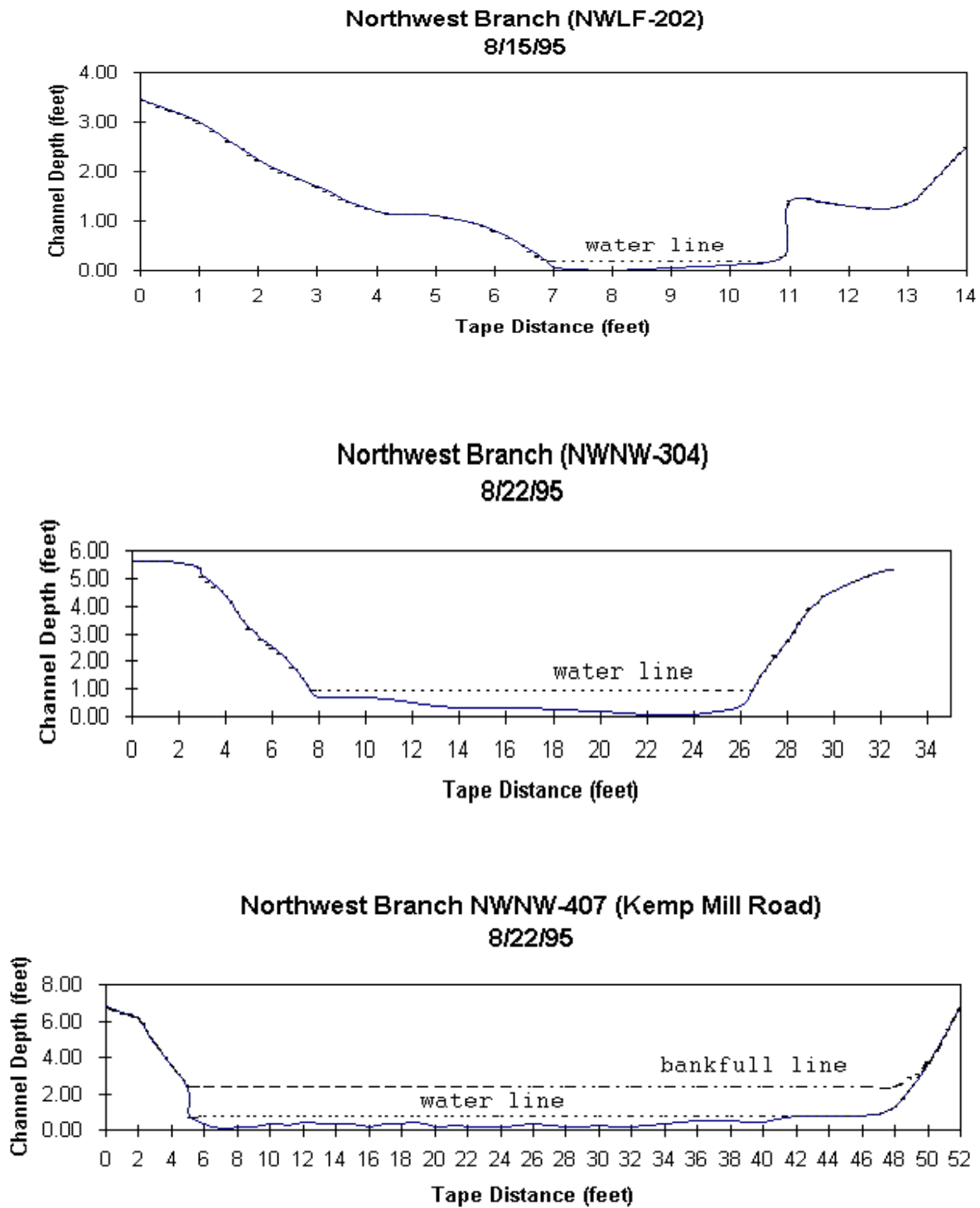


Figure 5. Cross sectional measurements in upper, middle, and lower stations.

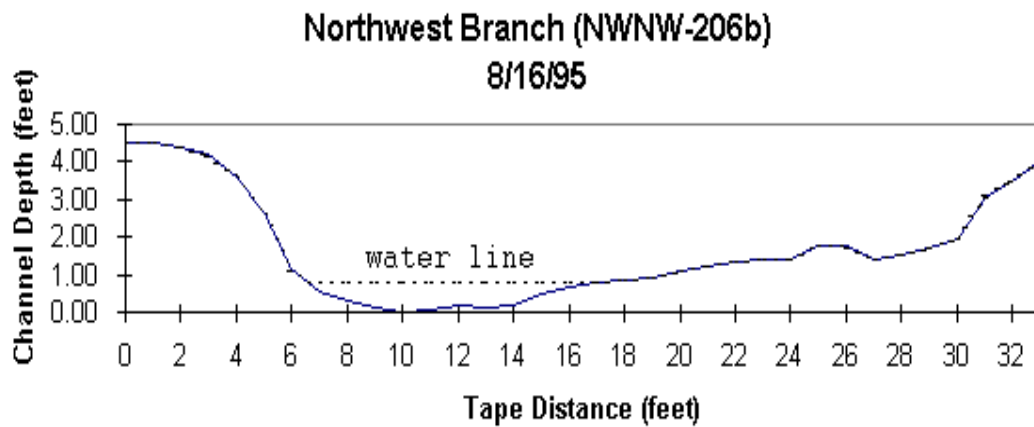
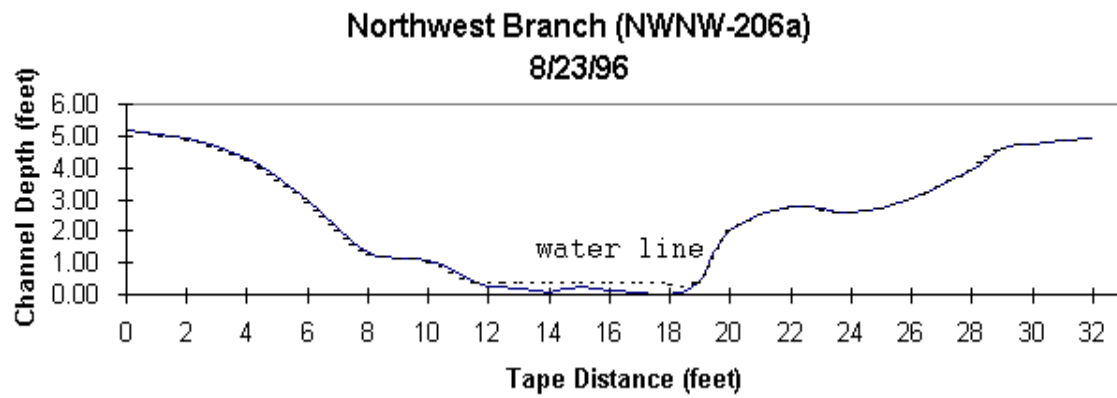


Figure 5, continued. Cross sectional measurements at the Bryants Nursery Tributary stations. This stream still has areas with access to the active flood prone area.

The Bryants Nursery Tributary stations (NWNW206 a & b) D50 was equivalent to small cobble to very coarse gravel (Figure 6). This subwatershed had an excellent resource condition in 1995 and in 1996 when the stations were again monitored as a result of assessing the impacts of a sediment violation. Almost every other station monitored in 1995 had a riffle D50 measurement equivalent to medium to coarse gravel (<32 mm) (Figure 6). The Rolling Stone Tributary had a riffle D50 of fine gravel (4 to 8 mm) (Figure 6). The predominance of small particles in the riffles can become a limiting factor to the ability of the benthic macroinvertebrate community in maintaining a diverse and high quality level of community composition.

Other Habitat Measurements

Graphs of water temperatures (recorded hourly) measured throughout the Northwest Branch depict a cool to warmwater resource (Figure 7). Diurnal temperatures during July and August, 1995 range around 22 to 24 degrees Fahrenheit.

Discussion

The overall resource condition of the Northwest Branch below the Northwest Branch Golf Course is almost without exception *fair to poor*. The only exception found in 1995 was the Rolling Stone Tributary which had a *good* resource condition. This is impressive given the amount of residential development in the subwatershed. The County built a SWM retrofit in the Rolling Stone Tributary five years ago. This SWM structure may have measurably assisted in the maintenance of the good resource conditions currently found in this subwatershed. Above the golf course, the majority of the subwatersheds had *excellent to good* resource conditions.

The primary stressors and cumulative impacts in the Northwest Branch appear to be stream habitat and flow related. Sediment impacts are significant and contribute to channel widening and entrenchment. While areas of the upper watershed still have access to the active floodplain and are in adjustment with the channel forming flows, the lower watershed is deeply entrenched and has, for the most part, lost access to the flood plain. Higher frequency of channel forming flows in the lower watershed will continue to erode the stream banks resulting in increased sediment load.

An ongoing watershed restoration initiative between the County, U.S. Corps of Engineers, and the M-NCPPC has begun. The goals of this effort are:

- o to provide for stream restoration in the upper watershed to maintain current *excellent to good* stream conditions, and
- o to provide for stream stabilization and retrofit opportunities in the lower watershed to provide flow control and to stabilize eroding stream banks.

In addition, DEP proposes to further investigate the Bel Pre Tributary through the Pipe Detectives program to detect and correct any illicit discharges in the drainage.

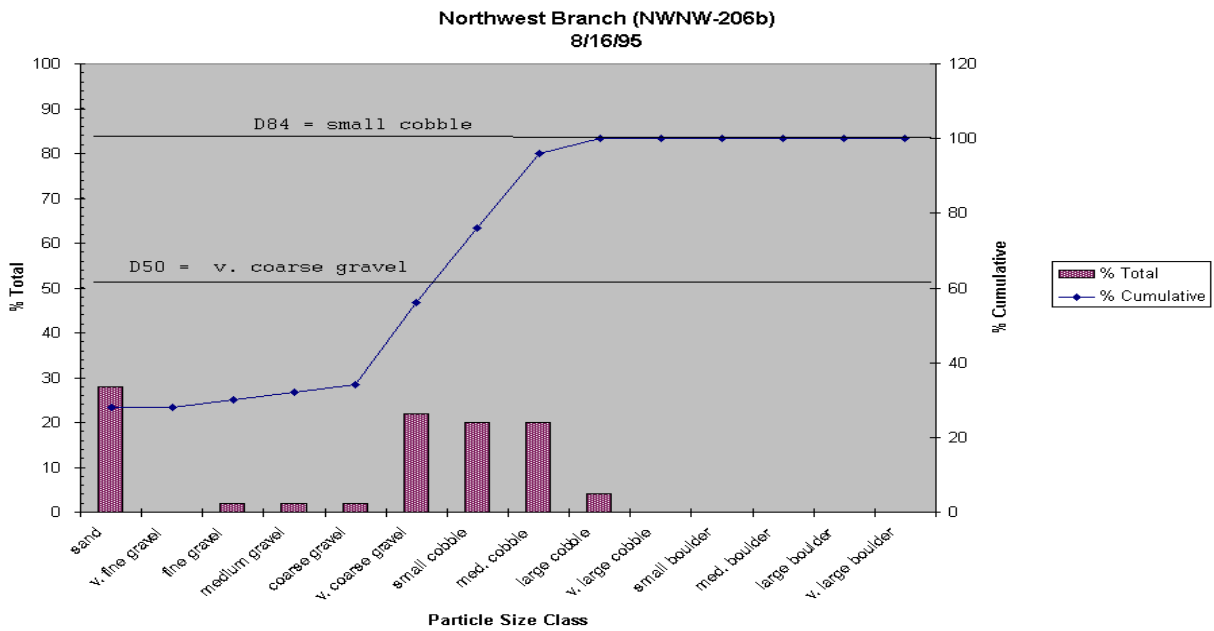
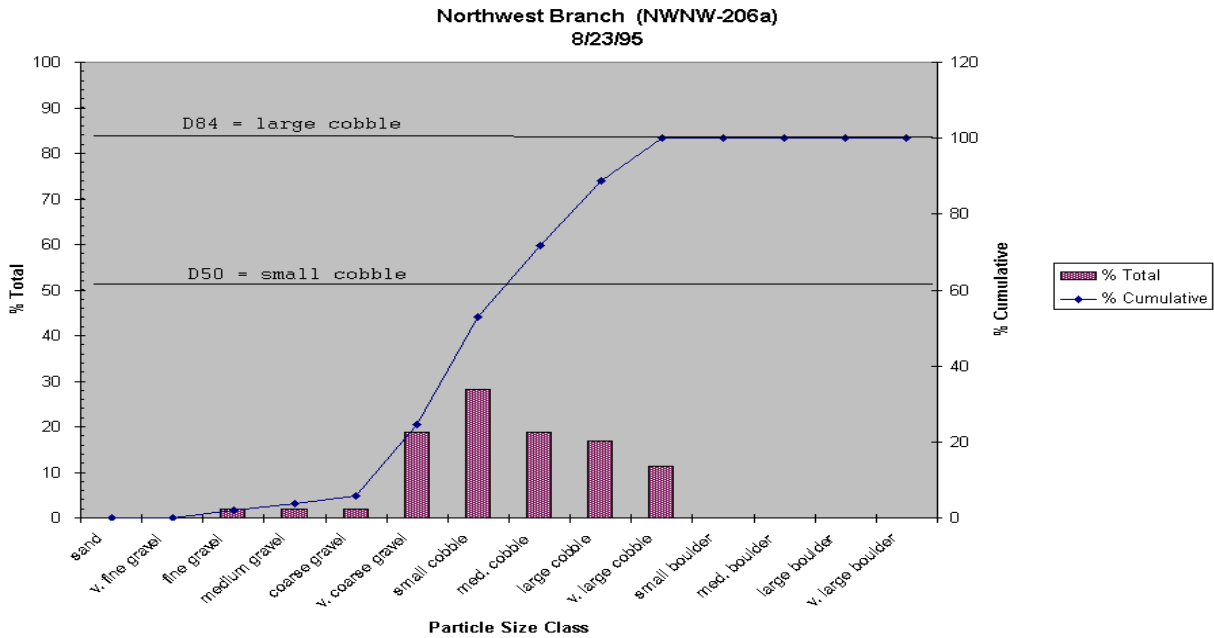


Figure 6. Analysis of Pebble Counts in the Bryants Nursery Tributary. D50 = small cobble to very coarse gravel.

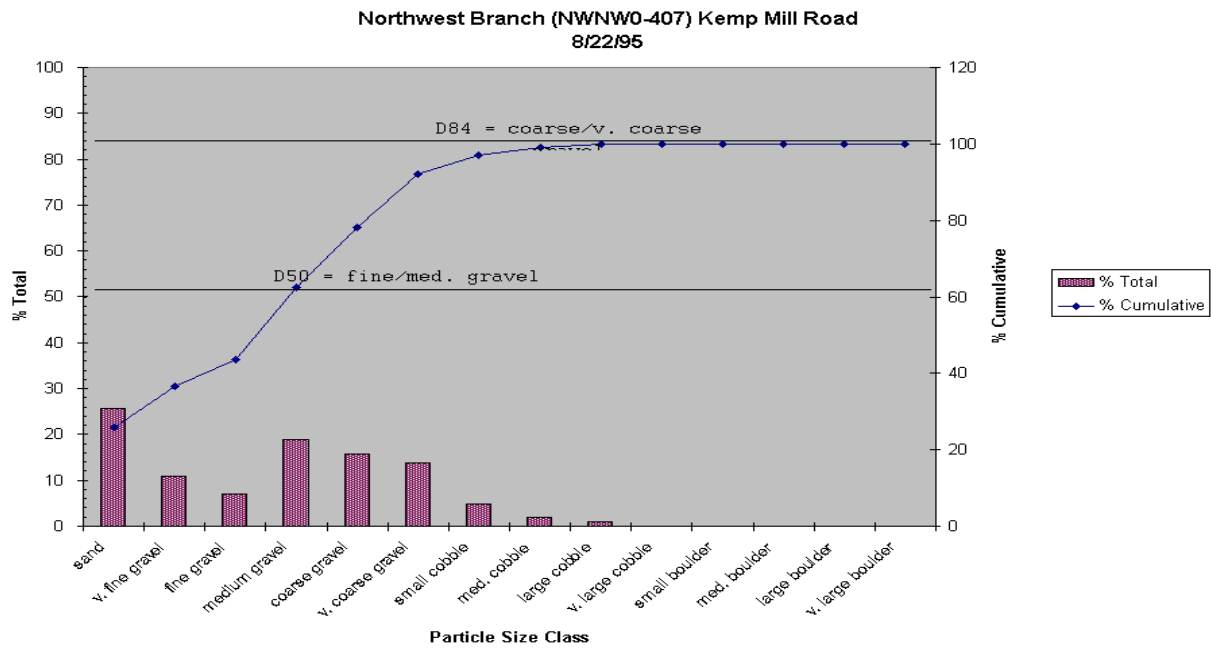
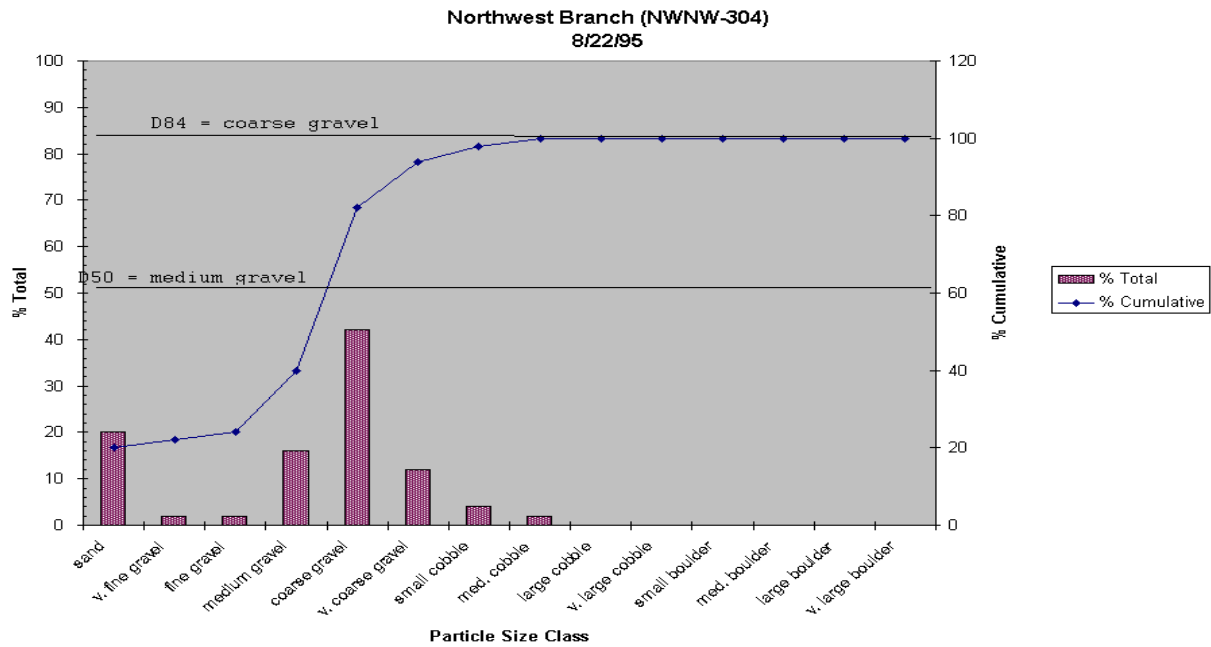


Figure 6. continued. Analysis of Pebble Counts from stations in the top (NWNW-304) and bottom (NWNW-407) of the watershed. D50= medium to fine/medium gravel.

